Douglas-fir Tussock Moth in California

The Douglas-fir tussock moth (DFTM), *Orgyia pseudotsugata,* is an important defoliator of white fir in California. Outbreaks of the native insect occur somewhere in the state about every 10 years. These outbreaks arise abruptly, but generally subside within one to two years. White fir is the primary host, but other tree species may be defoliated during outbreaks. Defoliation by DFTM may weaken, kill, or top-kill trees. Heavily defoliated trees may experience reduced growth for several years post outbreak and be more susceptible to attacks by bark beetles. Ninety percent of mortality occurs in trees that are ≥ 90% defoliated, while trees with ≤ 50% defoliation rarely die. Top-kill follows a similar trend.

Defoliation first appears in late spring. Larvae from newly-hatched eggs feed on current year's foliage, causing it to shrivel and turn brown. Older larvae may feed on both current and old foliage, although current needles are preferred. Defoliation occurs first in the tops of the trees and the outermost portions of the branches, and then in the lower crown and farther back on the branches.

Douglas-fir tussock moth larvae (differences in color and size are due to stage of development).

The adult male is a gray-brown to black-brown moth with feathery antennae and a wingspread of 1 to 1 1/4 inches. The forewings are gray brown and have two distinct, irregular dark bars and two vague whitish spots. The hindwings are a contrasting brown. The female has tiny rudimentary wings, small threadlike antennae, and a large abdomen. Young larvae are 1/8 to 1/4 inch long and have long, fine body hairs which later develop into tufts. Mature larvae are up to 1 1/4 inches long and very colorful. Two long, dark tufts or pencils of hair similar to horns are located right behind the head. Four dense, buff colored tussocks are located forward along the middle of the back. The rest of the body except for the legs and head is covered with short hairs radiating from red, button like centers (see photo).

The DFTM produces one generation per year. Females mate soon after they emerge from their pupal cocoon. Eggs hatch in early June, coincident with bud break and shoot elongation of host trees. The larvae pass through four to six instars and pupate toward the end of the July. The pupal stage lasts from 10-18 days depending on temperature.

Natural controls keep DFTM populations low most of the time. There is some indication that fir growing on pine sites and fir stands located on warm, dry sites are most susceptible to damage. In these forest situations, silvicultural treatments that reduce the number of susceptible hosts and decrease the multi-storied characteristics of host stands are recommended to prevent outbreaks.

When population levels are high enough to cause unacceptable damage, methods of direct control are available. The viral insecticide, TM-Biocontrol-1, is currently registered in California for use against DFTM. Other registered insecticides are also effective against DFTM including broad spectrum insecticides and more targeted growth regulators and microbial insecticides. Applications of insecticides are made aerially over large areas or with ground based equipment on individual trees. Where DFTM-caused defoliation is expected in high value areas, such as recreation areas or on individual high-value trees, pesticide use may be warranted to minimize tree mortality and reduce public exposure to the insect.

Public Health Concerns

The hairs on the caterpillars as well as their egg masses and cocoons may cause allergic reactions in some people. Itching is the most common complaint, but adverse health effects can include rashes (with welts or blisters), watery eyes, runny nose, cough and, less commonly, shortness of breath, wheezing, and chest tightness. Hot weather and perspiration increase the severity of symptoms, and people with a history of allergies may be more susceptible to "tussockosis." Accidental disturbance or handling of old larval skins and spent cocoons, deposited under leaf litter, bark, wood piles, timber, or any other material that caterpillars have touched, can result in irritation. Irritation intensity depends upon the amount of contact with the caterpillar and the sensitivity of the person. The effects may be cumulative, with successive exposures resulting in elevated symptoms. During a 1998 outbreak at Grant Grove in Kings Canyon National Park, approximately 100 people sought medical attention or advice, resulting in a temporary closure of the area for health and safety reasons.

Current Conditions

Limited outbreaks of DFTM were observed in northern California in 2013 and again in 2014. Damage (defoliation) for 2014 has already passed, so no control is currently warranted. Evaluations will be conducted this fall to determine what, if any, defoliation might occur in 2015.

Additional information on DFTM:

"White fir recovery following Douglas-fir tussock moth Bear Mountain outbreak" found at http://caforestpestcouncil.org/resources/

Forest Insect and Disease Leaflet 86: http://www.na.fs.fed.us/spfo/pubs/fidls/tussock/fidl-tuss.htm

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